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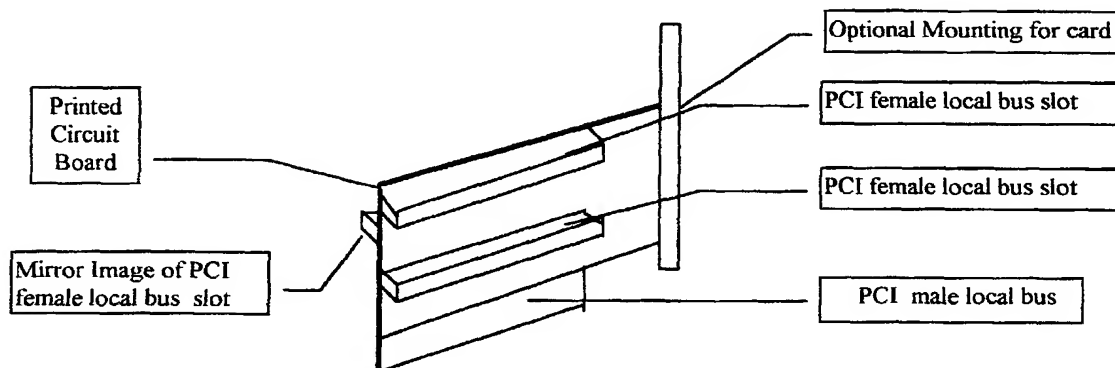
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(54) Title: PARALLEL EXPANSION LOCAL BUS INTERFACE CARD-TYPE I, II & III



(57) Abstract: A modular architecture for a computer uses combinations of bus interface cards. Various types of bus interface cards (Parallel Type I-Combined Male & Female ...) use any of the appropriate types of expansion bus interface standards, allowing the standard size peripheral add-on cards and or memory RAM modules to be interfaced with the main board at a position parallel to the main board, thereby reducing the minimal height of the computer and making it more compact. Particularly a main board with the male bus component can be directly connected in parallel or in series (on the same plane) to each other or to the peripheral add - on cards with the use of the appropriate Parallel Type III (female/female) local bus card. Additionally bus interface cards (parallel Type Male/male) or Type III (Female/female) allow a more compact stacked form of two or more mainboards directly connected. A male bus component and this main board can be connected in parallel or in series (on the same plane) to each other and or to the peripheral add - on card/s with the use of an appropriate Parallel Type III (female/female) local bus card. The edge connector of the add - on peripheral card may be on more than one edge of the printed circuit board. The bus interace cards (Type III - Female/female) with the male local bus interface at one or more edges of the printed circuit board are directly connected and the peripheral add - on cards are positioned in series or parallel to the main board using standard size components. The main board can be square, rectangular hexagonal or of any other shape. The sizes of the bus interface and also the various bus interface cards (Parallel Type I, II or III) are arbitrary.

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Title : Parallel Expansion Local Bus Interface Card - Type I, II & III

Field : Computer

Background :

Generally computers use various forms of interface standards architecture like ISA, EISA, MCA, VL-Bus, PCI, AGP and other types of expansion bus to connect directly the main board to the peripheral add-on cards (like video display cards, sound cards, ethernet cards.) and 168pin SIMM, DIMM and RDRAM memory ram modules which are at 90 degrees position to the main boards.

The main board have one or more central processing unit (CPU) as the brain centre and any additional CPU increases the performance of the computer, other than by increasing the RAM memory type and memory size (megabytes). The result is that the minimal size for the computers are based on the dimensions of the main board and the height of the peripheral add-on cards, generally 3.5 inches and the size of the internal peripheral devices.

Current main boards do not have the male local bus interface at one or more edges of the printed circuit board. They have instead the female local bus interface slots on the main board itself. Current computer main boards operate individually and independently in separate casings unless they are indirectly connected externally via a network using network cards. Current add-on cards have only one male edge connector at one edge of the printed circuit board.

ISA refers to Industry Standard Architecture.

EISA refers to Extended Industry Standard Architecture

MCA refers to Micro Channel Architecture.

PCI refers to Peripheral Component Interconnect

AGP refers to Accelerated Graphics Port

RAM refers to Random Access Memory

VL-Bus refers to Video Electronics Standards Association (VESA) Local Bus architecture

Description :

The parallel expansion local bus (ISA, PCI, AGP or any faster interface standards and 168pin memory ram SIMM, DIMM RDRAM or faster modules) interface card are of three types each, Type I (combined male/female), Type II (male/male), Type III (female/female) interface connectors and include any variation/s in physical size of the interface connectors. The proposal includes a new type of main board with one or more male edge connector/s on one or more edge/s of the printed circuit board. The proposal also include a new type of add-on peripheral card with one or more male edge connector/s on more than one edge/s of the printed circuit board.

NB: PCI, ISA and AGP refers to all the various possible types of expansion bus interface standards known and or being developed and or are not yet developed.

NB: The term "male" apply to the male edge connector/s and the term "female" apply to the female bus slot/s

The variations of the Type I , II and III interface card/connector in detail are as follows :

1. Type I (Combined Male/female) Variation 1 connector : A printed circuit board (PCB) of varying sizes and shape and with one 64 bit PCI male local bus (in any size) at one edge (in alignment to the PCI female local bus slot) and as part of the printed circuit board and with 1 or more PCI female local bus slots (of corresponding or any size) mounted parallel to the same edge on the printed circuit board (PCB) and with the PCI male local bus wired to the corresponding pins on the PCI female local bus slots/s using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed and without any other electronic, electromagnetic, CPU or memory devices. - See Figure 1 and 2.
2. Type I (Combined Male/female) Variation 2 connector : As in the above but with one or more PCI male local bus at more than one edge of the printed board. - See Figure 3.

3. Type I (Combined Male/female) Variation 3 connector: As in all the above but with one or more PCI female local bus slots mounted (parallel to another PCI female local bus slot) to and wired appropriately on both sides of the circuit board using the mirror image of the PCI female local bus slot/s on the opposite side of the PCB. - See Figure 4 and 5.
4. Type II (Male/male) Variation 1 connector : /Page 2/6 circuit board (PCB) of varying sizes and any shape and with two 64 bit PCI male local bus (in any size) wired back to back (in alignment with each other) using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed, and without any other electronic, electromagnetic, CPU or memory devices - See Figure 6 and 7.
5. Type II (Male/male) Variation 2 connector : As in Type II (Male/male) variation 1 above but with one or more PCI male local bus on one or more edge/s of the printed circuit board wired back to back. - See Figure 8. Both Type II variation 1 and 2 when combined with variations of Type I and or Type III local bus expansion card allows the modular architecture for a new type of computer
6. Type II (Male/male) Variation 3 connector : As in the above Type II (Male/male) variations 1 & 2 but with a flexible cable joining the two PCI male local bus back to back in alignment to each other.
7. Type III (Female/female) Variation 1 connector : A printed circuit board (PCB) of varying sizes with two or more 64 bit PCI female local bus slots (in any size), mounted (parallel to another each other) on one side and wired together (for two or more PCI female local bus slots in any size) on corresponding pins without any other electronic, electromagnetic, CPU or memory devices using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed - See Figure 9
8. Type III (Female/female) Variation 2 connector : As in Type III (Female/female) variation 1 above but with one or more PCI female local bus slots mounted on both sides of the printed circuit board using the mirror image of the PCI female local bus slot/s mounted on the opposite side and wired together on corresponding pins. -See Figures 10, 11 and 12
9. Type III (Female/female) Variation 3 connector : As in Type III (Female/female) variations 1 and 2 above but with flexible cables linking the two or more PCI female local bus slots as a single or in multiple combinations wired together on corresponding pins.
10. Type III (Female/female) Variation 4 connector: As in Type III (Female/female) variation 2 above but with a PCI female local bus slot joined directly back to back to a mirror image of the PCI female local bus slot as a single united pair (see Figure 12) or in multiple united pairs (see Figure 11). This combined with variations of Type I and or Type II local bus expansion card allows the modular architecture to be applied to a new type of computer
11. Variation 11 : As in all the above but with ISA, and/or AGP and/or shared PCI/ISA, and /or shared PCI/AGP and/or shared ISA/AGP and or any shared combinations of male local bus connector and or female local bus slot and or any other faster interface standard/s instead of PCI male local bus and PCI female local bus slots.
12. Variation 12 : As in all the above but with any 8 bit, 16 bit, 24 bit, 32 bit, 64 bit, 128 bit, 256 bit, 512 bit or higher or any other male local bus in current standard size or smaller size or miniature size or any other size and or corresponding female local bus slot in current standard size or smaller size or miniature size or any other size instead of PCI male local bus and PCI female local bus slot.
13. Variation 13 : As in all the above but with combination/s of PCI and or ISA and or AGP and or any 8 bit, 16bit, 24 bit, 32 bit, 64 bit, 128 bit, 256 bit, 512 bit, or higher and or any other male local bus and combination/s of PCI and or ISA and or AGP and or shared PCI/ISA, and/or shared PCI/AGP, and/or shared ISA/AGP and or any 8 bit, 16 bit, 24 bit, 32 bit, 64 bit, 128 bit, 256 bit, 512 bit or higher and or any other single or shared female local bus slots instead of PCI male local bus and PCI female local bus slot.
14. Variation 14 : As in any of the above but with the memory ram slot for the 168 pin SIMM, DIMM, RDRAM or faster memory ram modules mounted on the PCB .

15. Variation 15 : As in any or all the above for Type I (combined male/female) interface card but with electrical, electronic, electromagnetic, CPU devices patented or otherwise. This variation makes it more than a parallel local bus card/connector. This is a new type of main board/s in any size and or of any shape (rectangular, square, hexagonal shape or any shape) with both the male local bus and the female local bus slot/s. There can be one or more male edge connector / local bus at one or more edge/s of the PCB. This new type of main board combined with Type II and or Type III local bus expansion card/s allow/s the modular architecture to be applied to a new type of computer - See Figures 13 and 14.
16. Variation 16 : As in any or all the above for Type II (Male/male) interface card but with electrical, electronic, electromagnetic, CPU devices patented or otherwise. This variation makes it more than a parallel local bus card/connector. This is a new type of add-on peripheral card/s in any size and or of any shape (rectangular, square, hexagonal shape or any shape) with one or more male edge connector/s at one or more edge/s of the PCB. This new type of add-on peripheral card/s which combined with Type I (combined male/female interface) connector/s and or Type III (female/female interface) connector/s and or expansion card/s; the modular architecture to be applied to a new type of computer - See Figures 13 and 14.
17. Variation 17 : A mirror image product of any or all of the above items..

Materials : PCB with/without components, female interface bus slot with metal connectors and plastic casing

Description of Difference from known products :

1. Type I combined male and female connector : There are no known printed circuit boards with the male local bus on one or more edges of the printed circuit board and with one or more corresponding female local bus slot mounted on the board (without any other electronic components mounted) as an intermediate connection between the main board and the add-on peripheral card/s and or for the purpose of reducing the minimal height of the computers by connecting the peripheral add-on cards parallel to the main board.
2. Type I combined male and female connector : There are no known printed circuit boards with both the male local bus on one or more edges of the printed circuit board and with one or more corresponding female local bus slot mounted on the board
3. Type I combined male and female connector : These products combine the two (the male local bus and the female local bus slots) together on the same board and also on both sides of the printed circuit board to produce a new type of parallel local bus card / connector , a new range and type of printed circuit board/s (a new type of main board/s) and for a new use.
4. Type II male/male connector : There are no known PCBs which have two male local bus on opposite edges of the PCB or one or more edge connector on more than one edge of the printed circuit board and forming part of the PCB which allows connection to two female local bus slots.
5. Type II male/male connector : This product is a new type of expansion local bus card/ connector. This is also a new type of add-on peripheral card with one or more edge connector at more than one edge of the PCB.
6. Type III female/female connector : There are no known printed circuit boards with only the female local bus slot connector and yet bare of all electrical, electronic, electromagnetic, CPU items.
7. Type III female/female connector : There are no known PCBs with the female local bus slots mounted on both sides of the PCB
8. Type III female/female connector : There are no known female local bus slots joined back to back with a mirror image of another female local bus slot whether as a single pair or as multiple pairs.

Description of Purpose and commercial use :

1. The use of the special parallel local bus card (Parallel Type I - Combined Male & Female) allow the usual PCBs with the female local bus slots to be connected parallel to the second or third PCB with the male local bus instead of the usual 90 degrees perpendicular position of the second PCB to the first PCB (called the main board), changing the direction and relation of the main board to the other printed circuit boards
2. This allows a more compact united form of the main board with the other printed circuit boards, making possible thinner casings to house the main board and the other printed circuit boards
3. The variations of the Type II male/male local bus card allows two or more main boards to be directly connected in parallel to another main board . This allows a more compact stacked form of two or more main boards directly connected, with greater enhanced performance. Current main boards operate individually and independently in separate casings unless they are indirectly connected externally via a network using network cards
4. The variations of the Type III female/female local bus card (including single or multiple pairs) allows for direct parallel connection of two or more printed circuit boards (main boards) with the corresponding male local bus. It directly connects two or more main boards stacked parallel to each other, whereas current main boards operate individually and independently in separate casings unless they are indirectly connected externally via a network using network cards. This allows a more compact stacked form of the new type of two or more main boards (with the male local bus interface at one or more edges of the printed circuit board) which are directly connected, with greater enhanced performance and capability and to position the peripheral add-on cards parallel to the main board, thereby reducing the minimal height for the computer while using standard size components.
5. With the new type of main board/s and the peripheral card/s, these can be connected in series or in parallel to each other to form modular computers.
6. A new type of modular computer using combinations of Type I and or Type II and or Type III. This allows modules to be exchanged or replaced without affecting the rest of the computer which can have two or more CPU modules in addition to a different module for each type of add-on card.

Drawings : See Figures 1 to 14

Summary :

The above variations of the various types of bus interface cards (Parallel Type I - Combined Male & Female) (using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet develop) allow the standard size peripheral add-on cards and or memory ram modules to be interfaced with the main board at a position parallel to the main board, reducing the minimal height of the computer and making it more compact. A particular variation is a new type of main board with the male bus component which can be directly connected in parallel and or in series (on the same plane) to each other and or to the peripheral add-on card/s with the use of the appropriate Parallel Type III (female/female) local bus card.

The above variations of the various types of bus interface cards (Parallel Type II - Male/male) (using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed) allow a more compact stacked form of two or more main boards directly connected, with greater enhanced performance. A particular variation is a new type of main board with the male bus component and this new type of main board can be directly connected in parallel and or in series (on the same plane) to each other and or to the peripheral add-on card/s with the use of the appropriate Parallel Type III (female/female) local bus card. Another particular variation is a new type of add-on peripheral card with the edge connector on more than one edge of the printed circuit board.

The above variations of the various types of bus interface cards (Type III - Female/female) (using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed) allow a more compact stacked form of the new type of two or more main boards allow a more compact stacked form of the new type of two or more main boards (with the male local bus interface at one or more edges of the printed circuit board) which are directly connected, with greater enhanced performance and capability and to position the peripheral add-on card/s

in series or in a parallel position to the main board, thereby reducing the minimal height for the computer while using standard size components.

Combinations of the Type I, and or II and or III allows a modular architecture for the computer

The term "shape" applies to square, rectangular, hexagonal, or any other shape where applicable.

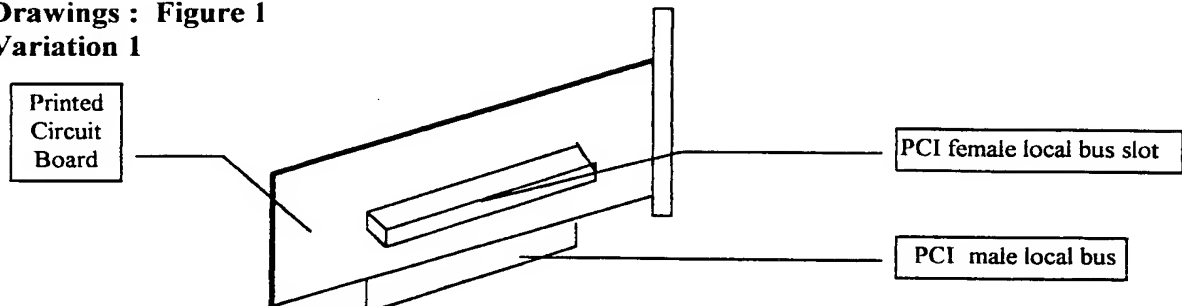
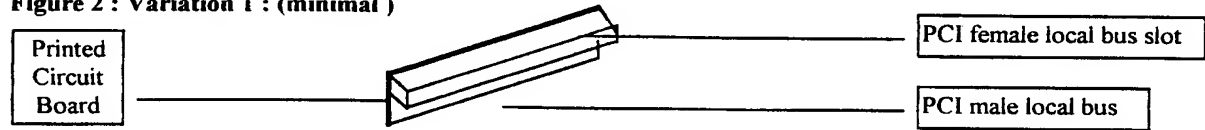
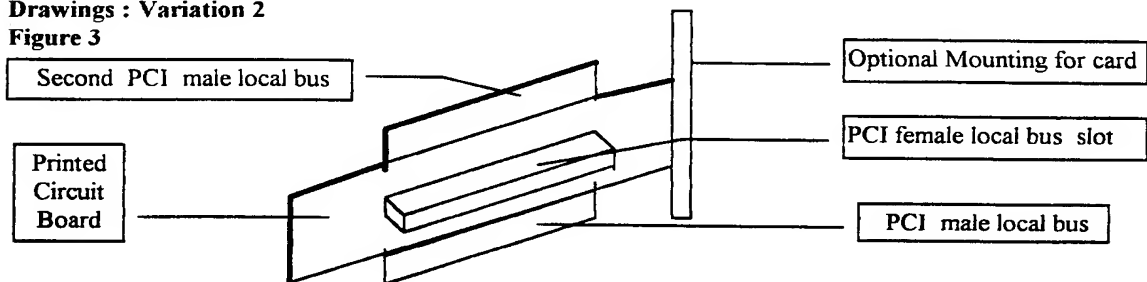
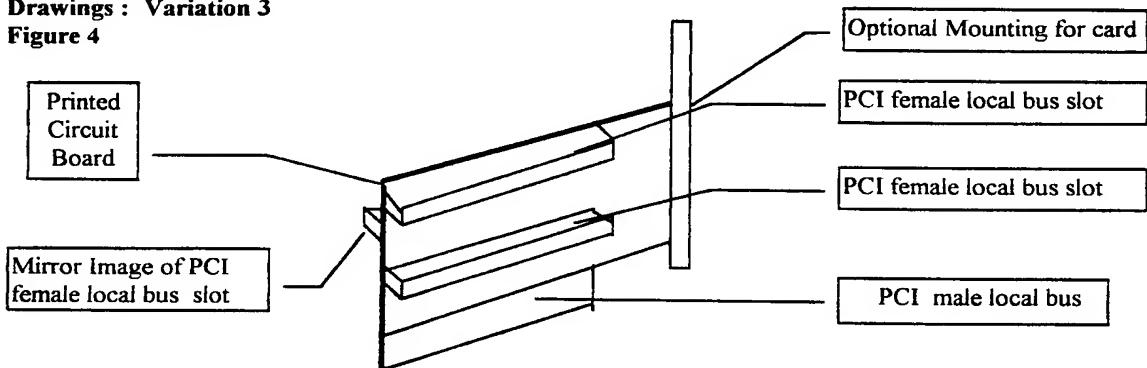
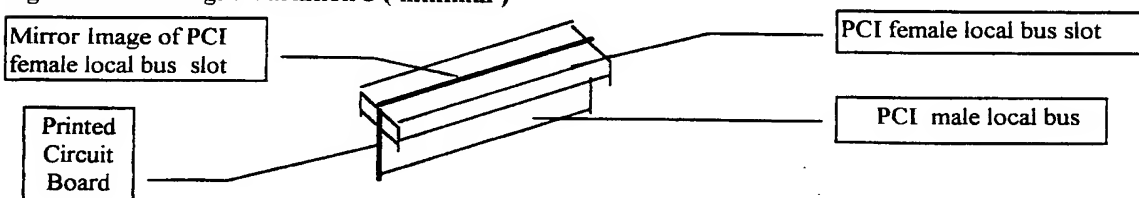
Where the physical size of the bus interface is varied whether it is larger, smaller or in miniature or in any other size, the various bus interface card (Parallel Type I, II & III) in its appropriate size will apply.

Title : Parallel Expansion Local Bus Interface Card -Type I, II & III**Field : Computer****Claims :****Patent is to provide protection for the following :**

1. The Concept of joining in parallel one printed circuit board (PCB) with female local bus slots to another printed circuit board with male local bus at one or more edge/s of the printed circuit board to reduce the height of the computer using any variation of the expansion local bus card (Parallel Type I - Combined Male & Female) of the appropriate local bus interface architecture using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed
2. Patent rights to all the variations of the new combined expansion local bus card (Parallel Type I - Combined Male & Female) with both female local bus slots and male local bus / edge connector with one or more edge connector at one or more edge/s of the PCB using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed
3. Patent rights to the PCI Type I adapter/connector known as PCI interface Type I female local bus slot mounted on a PCB with male edge connector
4. Patent rights to the AGP Type I adapter/connector known as AGP interface Type I female bus slot mounted on a PCB with male edge connector.
5. Patent rights to the Slot I Type I adapter/connector known as Slot I interface Type I female bus slot mounted on a PCB with male edge connector.
6. Patent rights to the Slot A Type I adapter/connector known as Slot A interface Type I female bus slot mounted on a PCB with male edge connector.
7. Patent rights to the memory ram slot Type I connector known as the 168 pin SIMM, DIMM or RDRam or faster female memory slot mounted on a PCB with the male edge connector.
8. The Concept of joining in parallel two printed circuit boards with female local bus slot/s like main boards using any of the variations of the expansion local bus card (Parallel Type II - Male/male) of the appropriate local bus interface architecture using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed
9. Patent rights to the new type of expansion local bus card (Parallel Type II - Male/male) and its variations in any size and using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed.
10. Patent rights to the PCI Type II adapter/connector known as PCI interface Type II male/male with male edge connectors on opposite edges of the PCB.
11. Patent rights to the AGP Type II adapter/connector known as AGP interface Type II male/male with male edge connectors on opposite edges of the PCB.
12. Patent rights to the Slot I Type II adapter/connector known as Slot I interface Type II male/male with male edge connectors on opposite edges of the PCB.
13. Patent rights to the Slot A Type II adapter/connector known as Slot A interface Type II male/male with male edge connectors on opposite edges of the PCB.
14. The Concept of joining in parallel two or more printed circuit main boards with male local bus and or to join the main board/s in the parallel position to any appropriate peripheral add-on cards using the expansion female local bus card (Parallel Type III - Female/female) of the appropriate local bus interface architecture using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed

15. The Concept of joining the new type of main board/s of any size or shape (rectangular, square, hexagonal shape or any other shape and with the male local bus interface at one or more edges of the printed circuit board) directly in parallel (on two or more parallel planes) and or in series (on the same plane) to each other and or to the peripheral add-on cards with the use of the appropriate Parallel Type III Female/female local bus card thereby reducing the height for the computer using any of the appropriate various possible types of e_{Page 6/6} bus interface standards known and or being developed and or are not yet developed
16. Patent rights to all the variations of the new expansion local bus card/device Parallel Type III Female/female using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed
17. Patent rights to the PCI Type III adapter/connector known as PCI interface Type III female/female bus slots joined back to back with each other
18. Patent rights to the AGP Type III adapter/connector known as AGP interface Type III female/female bus slots joined back to back with each other.
19. Patent rights to the Slot I Type III adapter/connector known as Slot I interface Type III female/female bus slots joined back to back with each other.
20. Patent rights to the Slot A Type III adapter/connector known as Slot A interface Type III female/female bus slots joined back to back with each other.
21. Patent rights to the memory ram slot Type III connector known as the 168 pin SIMM, DIMM, RDRam or faster memory ram modules joined back to back with each other.
22. Patent rights to the new main board/s of any size or shape (rectangular, square, hexagonal shape or any shape) with combined female local bus slots and male local bus / edge connector with one or more edge connector at one or more edge/s of the PCB using any of the appropriate various possible types of expansion bus interface standards known (including PCI, AGP, Slot I, Slot A and memory modules) and or being developed and or are not yet developed
23. Patent rights to all the variations of the new type of main board/s of any size or shape (rectangular, square, hexagonal shape or any shape) with one or more male local bus on one or more edges of the printed circuit board and as part of the printed circuit board (with or without any female bus slot on the main board/s) using any of the appropriate various possible types of expansion bus interface standards known (including PCI, AGP, Slot I, Slot A and memory modules) and or being developed and or are not yet developed.
24. Patent rights to the new type of add-on peripheral cards of any size or shape (rectangular, square, hexagonal shape or any shape) with one or more male local bus on more than one edge of the printed circuit board and as part of the printed circuit board (with or without any female bus slot on the PCB) using any of the appropriate various possible types of expansion bus interface standards known (including PCI, AGP, Slot I, Slot A and memory modules) and or being developed and or are not yet developed.
25. Patent rights to any and all the mirror image/s of any and or all of the various local bus interface card/s (Parallel Type I, II & III) and or the new type/s of main board/s using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed using any of the appropriate various possible types of expansion bus interface standards known and or being developed and or are not yet developed
26. Patent rights to the concept and or production of modular computers using the various combinations of Type I, and or II and or III applied to the modular architecture for computers using several special boards each complete for the module and joined to each other on two to four edges with the add-on cards (sound card, ethernet card, display card and others) which require an external port to be placed on the outer margins of the completed modular computer (see Annex 4)
27. Where the physical size of the bus interface/s and or the new type of main board/s and or the new add-on peripheral card/s is/are varied whether it is larger, smaller or in miniature or in any other size, the various bus interface card/s (Parallel Type I - Combined Male & Female, Type II - Male/male, and Type III - Female/female) and or the new type of main board/s and or the new add-on peripheral card/s in its appropriate size will apply
28. The term "shape" applies to all shapes (square, rectangular, hexagonal and or any other shape).

29. The term local bus interface includes all and any variation/s of the ISA, PCI, AGP interface standards or any faster interface standards or any other interface standards known or being developed and or are not yet developed.
30. The design, manufacture, utilisation and sale of the any and or all the above items using all or any of the local bus standard architecture known and or being developed and or are not yet developed and the sale of other products using any of the above items in their product, except by the owner of the patent and/or his agent/s
31. All of these claims apply particularly to the personal computer, IBM and compatibles including workstations and servers, and also to other types of computers where applicable.

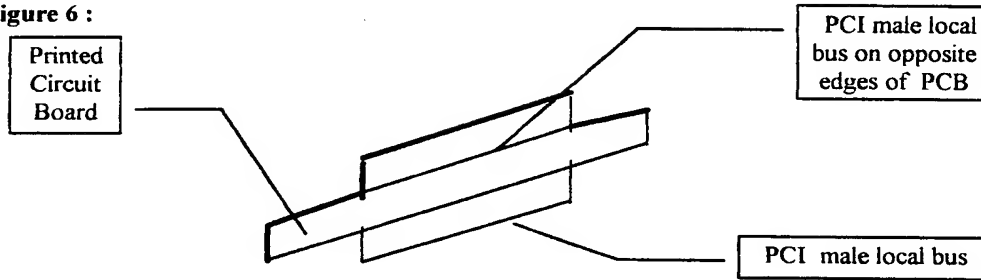
Title : Parallel Expansion Local Bus Card - Type I (Combined Male and Female)**Drawings : Figure 1**
Variation 1**Figure 2 : Variation 1 : (minimal)****Drawings : Variation 2**
Figure 3**Drawings : Variation 3**
Figure 4**Figure 5 : Drawings : Variation 3 (minimal)**

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Title : Parallel Expansion Local Bus Card - Type II (Male/male)

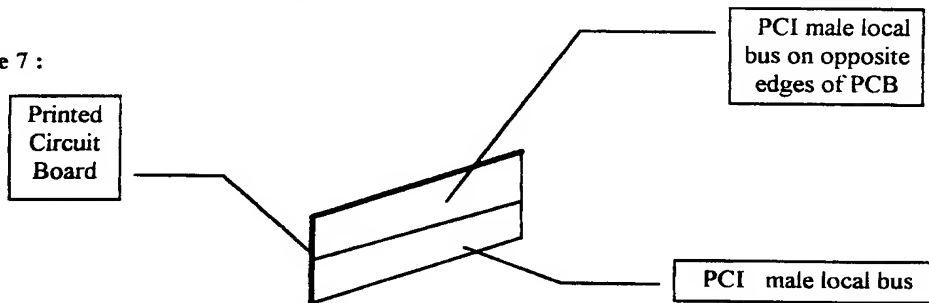
Drawings : Variation 1

Figure 6 :



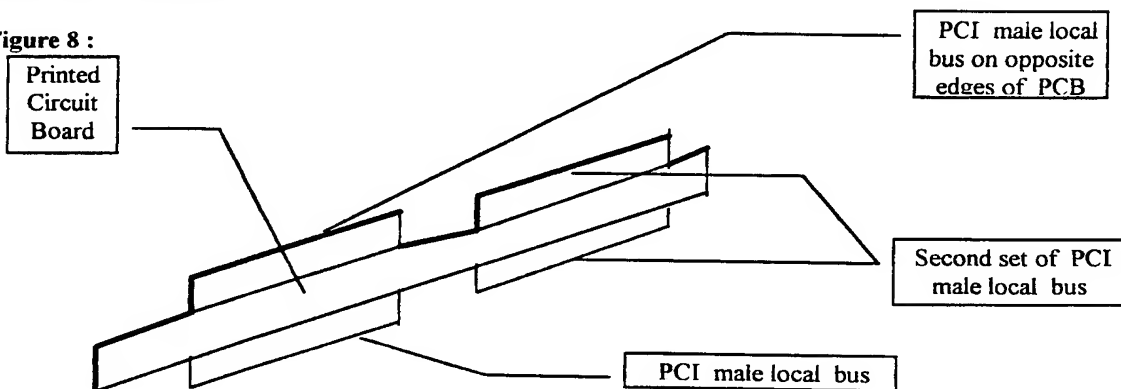
Drawings : Variation 1 (alternate)

Figure 7 :

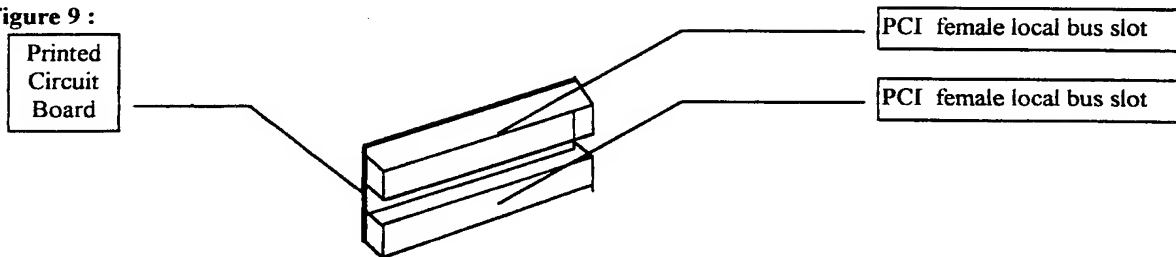
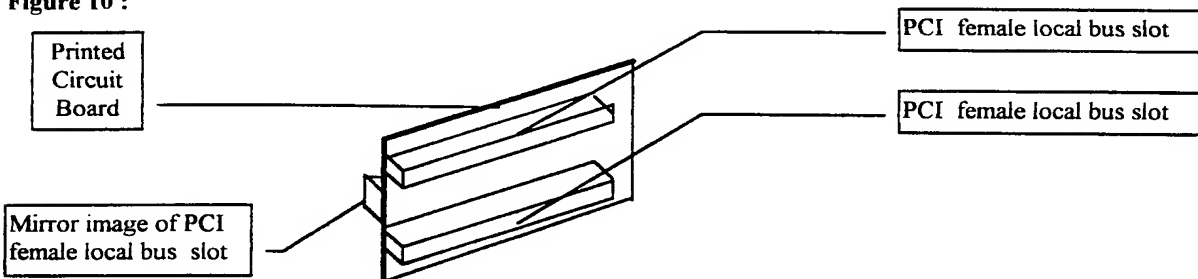
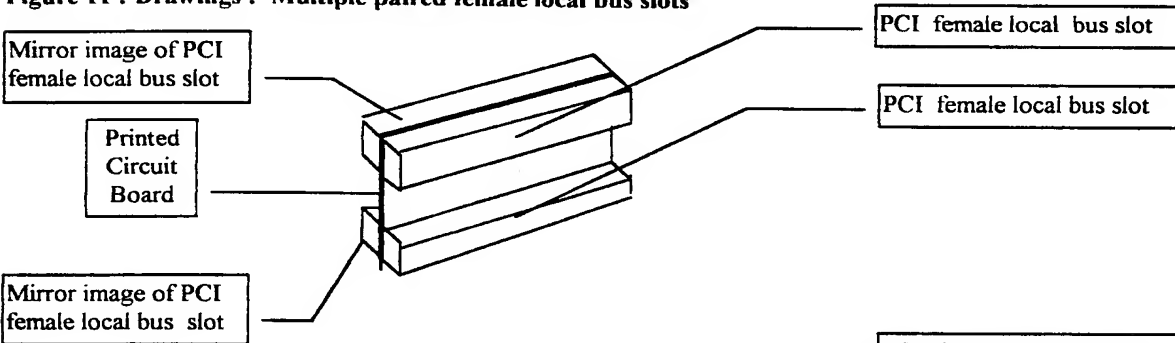
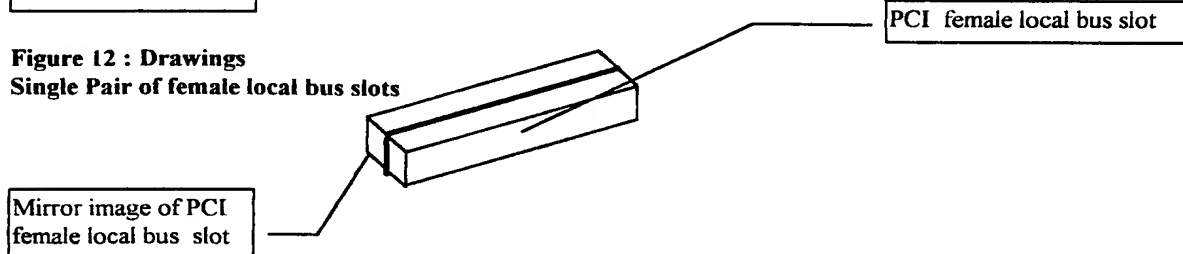


Drawings : Variation 2

Figure 8 :



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Title : Parallel Expansion Local Bus Card - Type III (Female/female)**Drawings : Variation 1****Figure 9 :****Drawings : Variation 2****Figure 10 :****Figure 11 : Drawings : Multiple paired female local bus slots****Figure 12 : Drawings
Single Pair of female local bus slots**

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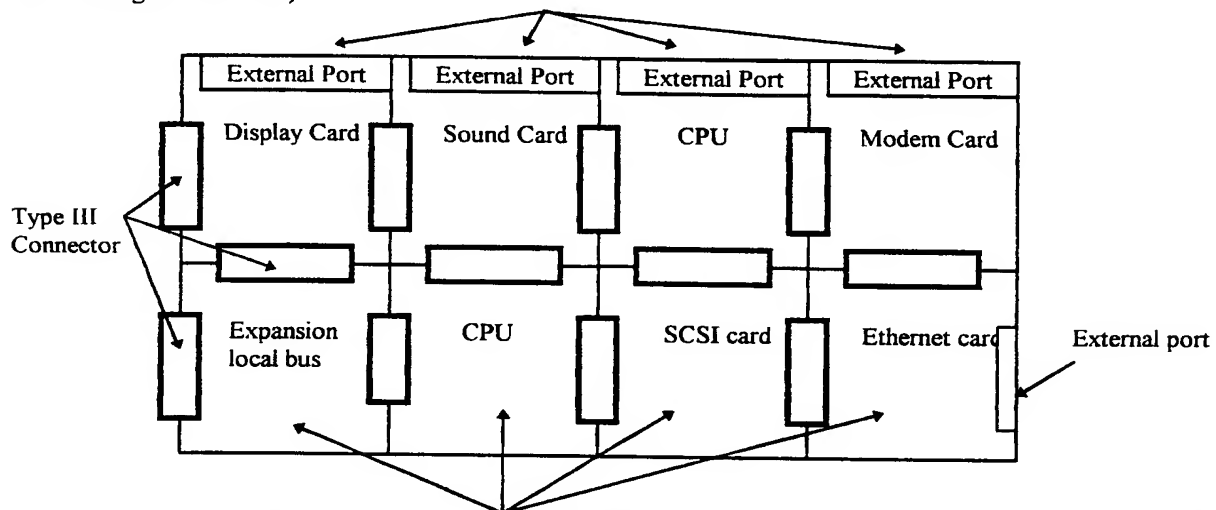
Title : Parallel Expansion Local Bus Card - Type I, II & III (The Modular Computer)

Field : Computer

**Drawings : The Modular Computer (in various combination/s size/s)
(on a single level or on more than one multiple parallel levels)**

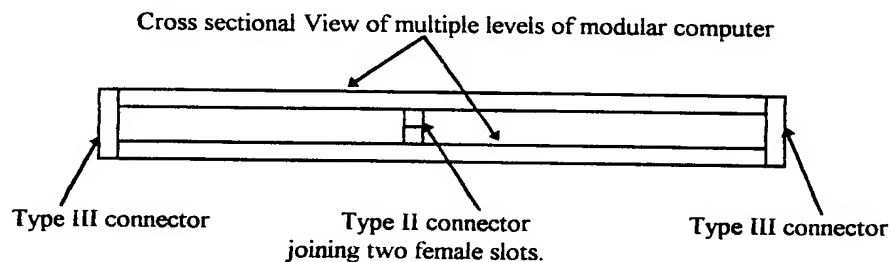
Figure 13 :

Type I and or Type II expansion bus cards (a new type of add-on cards with one or more edge connector at more than one edge of the PCB)



Type I and or Type II expansion local bus card (a new type of main board or add-on card with one or more edge connector at one or more edge/s of the PCB)

Figure 14 : Drawings : Modular Computer with more than one multiple levels



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG 00/00104

CLASSIFICATION OF SUBJECT MATTER

IPC⁷: H 05 K 1/14, H 01 R 12/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: H 01 R, F 42 C, H 05 K, G 06 F, G 11 C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPOQUE (WPI)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 4333696 A (O'NEILL) 8 June 1982 (08.06.82) Fig. 1-3b; abstract; column 3, line 58 - column 5, line 45; claims.	15-31 1-14
Y A	WO 98/04977 A1 (FIELDWORKS) 5 February 1998 (05.02.98) Fig.; abstract; pages 3-15; claims.	15-31 1-14
Y A	US 4196957 A (BENASUTTI) 8 April 1980 (08.04.80) Fig. 1; abstract; columns 1-3; claims 3-11.	1-15 16-31
Y A	US 4734042 A (MARTENS) 29 March 1988 (29.03.88) Fig. 1,2; abstract; column 1, lines 22-30; column 2, line 32 - column 3, line 19; claims.	1-7 8-31

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

„A“ document defining the general state of the art which is not considered to be of particular relevance

„E“ earlier application or patent but published on or after the international filing date

„L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

„O“ document referring to an oral disclosure, use, exhibition or other means

„P“ document published prior to the international filing date but later than the priority date claimed

„T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

„X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

„Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

„&“ document member of the same patent family

Date of the actual completion of the international search

25 January 2001 (25.01.2001)

Date of mailing of the international search report

2 February 2001 (02.02.2001)

Name and mailing address of the ISA/AT

Austrian Patent Office
Kohlmarkt 8-10; A-1014 Vienna

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Authorized officer

KRAL

Telephone No. 1/53424/335

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SG 00/00104

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4632475 A (TOMITA) 30 December 1986 (30.12.86) Fig.; abstract; column 3 - column 4, line 45; claims.	8-13
A		1-7,14-31
Y	US 4836107 A (LANG) 6 June 1989 (06.06.89) Fig. 3,4; abstract; column 5, line 49 - column 6, line 28.	14
A		1-13,15-31
A	DE 19709940 A1 (SIEMENS NIXDORF) 1 October 1998 (01.10.98) Fig.; abstract; columns 1,2.	1-31
P,A	EP 0889682 A2 (DIGITAL EQUIPMENT) 7 January 1999 (07.01.99) Fig. 1,3,5,8; abstract; column 3, line 42 - column 6, line 58; claims.	1-31

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SG 00/00104

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
US	A	4333696	08-06-1982	none		
WO	A1	9804977	05-02-1998	AU	A1	39659/97
US	A	4196957	08-04-1980	CA	A1	1111918
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